

(2) Assure the ability to perform essential safety functions assuming occurrence of design basis events.

(3) Separate the ventilation of excavation and waste emplacement areas.

(h) *Engineered barriers.* Engineered barriers shall be designed to assist the geologic setting in meeting the performance objectives for the period following permanent closure.

(i) *Thermal loads.* The underground facility shall be designed so that the performance objectives will be met taking into account the predicted thermal and thermomechanical response of the host rock, and surrounding strata, ground-water system.

[48 FR 28222, June 21, 1983, as amended at 50 FR 29648, July 22, 1985; 61 FR 64270, Dec. 4, 1996]

§ 60.134 Design of seals for shafts and boreholes.

(a) *General design criterion.* Seals for shafts and boreholes shall be designed so that following permanent closure they do not become pathways that compromise the geologic repository's ability to meet the performance objectives or the period following permanent closure.

(b) *Selection of materials and placement methods.* Materials and placement methods for seals shall be selected to reduce, to the extent practicable:

(1) The potential for creating a preferential pathway for groundwater to contact the waste packages or

(2) For radionuclide migration through existing pathways.

[48 FR 28222, June 21, 1983, as amended at 50 FR 29648, July 22, 1985]

DESIGN CRITERIA FOR THE WASTE PACKAGE

§ 60.135 Criteria for the waste package and its components.

(a) *High-level-waste package design in general.* (1) Packages for HLW shall be designed so that the in situ chemical, physical, and nuclear properties of the waste package and its interactions with the emplacement environment do not compromise the function of the waste packages or the performance of the underground facility or the geologic setting.

(2) The design shall include but not be limited to consideration of the following factors: solubility, oxidation/reduction reactions, corrosion, hydriding, gas generation, thermal effects, mechanical strength, mechanical stress, radiolysis, radiation damage, radionuclide retardation, leaching, fire and explosion hazards, thermal loads, and synergistic interactions.

(b) *Specific criteria for HLW package design—(1) Explosive, pyrophoric, and chemically reactive materials.* The waste package shall not contain explosive or pyrophoric materials or chemically reactive materials in an amount that could compromise the ability of the underground facility to contribute to waste isolation or the ability of the geologic repository to satisfy the performance objectives.

(2) *Free liquids.* The waste package shall not contain free liquids in an amount that could compromise the ability of the waste packages to achieve the performance objectives relating to containment of HLW (because of chemical interactions or formation of pressurized vapor) or result in spillage and spread of contamination in the event of waste package perforation during the period through permanent closure.

(3) *Handling.* Waste packages shall be designed to maintain waste containment during transportation, emplacement, and retrieval.

(4) *Unique identification.* A label or other means of identification shall be provided for each waste package. The identification shall not impair the integrity of the waste package and shall be applied in such a way that the information shall be legible at least to the end of the period of retrievability. Each waste package identification shall be consistent with the waste package's permanent written records.

(c) *Waste form criteria for HLW.* High-level radioactive waste that is emplaced in the underground facility shall be designed to meet the following criteria:

(1) *Solidification.* All such radioactive wastes shall be in solid form and placed in sealed containers.

§ 60.136

(2) *Consolidation.* Particulate waste forms shall be consolidated (for example, by incorporation into an encapsulating matrix) to limit the availability and generation of particulates.

(3) *Combustibles.* All combustible radioactive wastes shall be reduced to a noncombustible form unless it can be demonstrated that a fire involving the waste packages containing combustibles will not compromise the integrity of other waste packages, adversely affect any structures, systems, or components important to safety, or compromise the ability of the underground facility to contribute to waste isolation.

(d) *Design criteria for other radioactive wastes.* Design criteria for waste types other than HLW will be addressed on an individual basis if and when they are proposed for disposal in a geologic repository.

PRECLOSURE CONTROLLED AREA

§ 60.136 Preclosure controlled area.

(a) A preclosure controlled area must be established for the geologic repository operations area.

(b) The geologic repository operations area shall be designed so that, for Category 2 design basis events, no individual located on or beyond any point on the boundary of the preclosure controlled area will receive the more limiting of a total effective dose equivalent of 0.05 Sv (5 rem), or the sum of the deep-dose equivalent and the committed dose equivalent to any individual organ or tissue (other than the lens of the eye) of 0.5 Sv (50 rem). The eye dose equivalent shall not exceed 0.15 Sv (15 rem), and the shallow dose equivalent to skin shall not exceed 0.5 Sv (50 rem). The minimum distance from the surface facilities in the geologic repository operations area to the boundary of the preclosure controlled area must be at least 100 meters.

(c) The preclosure controlled area may be traversed by a highway, railroad, or waterway, so long as appropriate and effective arrangements are made to control traffic and to protect public health and safety.

[61 FR 64270, Dec. 4, 1996]

10 CFR Ch. I (1–1–05 Edition)

PERFORMANCE CONFIRMATION REQUIREMENTS

§ 60.137 General requirements for performance confirmation.

The geologic repository operations area shall be designed so as to permit implementation of a performance confirmation program that meets the requirements of subpart F of this part.

Subpart F—Performance Confirmation Program

SOURCE: 48 FR 28228, June 21, 1983, unless otherwise noted.

§ 60.140 General requirements.

(a) The performance confirmation program shall provide data which indicates, where practicable, whether:

(1) Actual subsurface conditions encountered and changes in those conditions during construction and waste emplacement operations are within the limits assumed in the licensing review; and

(2) Natural and engineered systems and components required for repository operation, or which are designed or assumed to operate as barriers after permanent closure, are functioning as intended and anticipated.

(b) The program shall have been started during site characterization and it will continue until permanent closure.

(c) The program shall include in situ monitoring, laboratory and field testing, and in situ experiments, as may be appropriate to accomplish the objective as stated above.

(d) The program shall be implemented so that:

(1) It does not adversely affect the ability of the natural and engineered elements of the geologic repository to meet the performance objectives.

(2) It provides baseline information and analysis of that information on those parameters and natural processes pertaining to the geologic setting that may be changed by site characterization, construction, and operational activities.

(3) It monitors and analyzes changes from the baseline condition of parameters that could affect the performance of a geologic repository.